

REMARKS

Claims 1-10 are pending in the Application.

REJECTIONS UNDER 103

1. Claims 1-10 stand rejected under 35 USC 103 as being unpatentable over U.S. Patent 4,314,041 Shimokawa ('041), in view of U.S. Patent 4,268,638 ('638). The rejection should be withdrawn in view of the remarks below.

Applicants' invention is directed to a thermoplastic molding composition comprising a graft polymer that contains:

- a) a continuous phase containing the polymerized product of at least one vinylaromatic monomer and at least one ethylenically unsaturated nitrile monomer, and
- b) a disperse phase containing ethylene/α-olefin rubber that is grafted with the polymerization product of at least one vinylaromatic monomer and at least one ethylenically unsaturated nitrile monomer

wherein the weight average molecular weight of the continuous phase is 130,000 to 275,000 g/mole and where the disperse phase is characterized in that its weight average particle size is less than 0.90 µm, its degree of grafting (measured by gel value measurement in acetone as solvent) is 0.25 to 0.65, the ratio of the gel value measured in THF to the gel value measured in acetone is less than 0.1 and the glass transition temperature of the ethylene /α-olefin rubber (determined by measuring the complex shear modulus as a function of the temperature) is less than -50°C.

The Office Action alleges that:

Shimokawa '041 discloses rubber-modified thermoplastic resin comprising a grafting a vinyl monomer mixture comprising of an aromatic alkenyl compound and a polar vinyl compound onto an ethylene-propylene-non-conjugated diene copolymer rubber, column 3, lines 12-35. The polymerization process is a continuous solution polymerization for producing the AES resin, column 3, lines 21-30 and 42-61, for the present Claim 6. The rubber EPDM particles are dispersed having size of 0.3 to 0.7 microns, for the

present Claim 1, column 4, line 2 and 35. The EPDM rubber is readable in the present claims, and a Tg of said rubber is expected being less than -50C, for the present Claim 1. The polymerization process comprises the polymerization conversion in the first polymerizer of from 40 to 80 % of the monomers and the grafting degree preferably to 30 % by weight, column 5, lines 65-68 and column 6, line 1. Then, the polymerization is completed with the final polymerization conversion of at least 85%, column 6, lines 24-26, for the present claim 6. None of these references discloses the presence of a molecular weight regulator, for the present Claim 6.

Shimokawa '041 does not disclose the gel value specified in the present Claim 1 as the ratio of the gel value measured in THF (tetrahydrofuran) to the gel value measured in acetone being less than 0.1. This is a low gel content.

Shimokawa '638 discloses substantially the same resulting rubber-modified thermoplastic resin to the invention of Shimokawa '041. Shimokawa '638 discloses a low gelation degree of not more than 5%, column 3, lines 7.

Regarding to the teachings of Shimokawa '638, it would have been obvious to one of ordinary skill in the art to consider that Shimokawa '041 also discloses a low gelation degree since both Shimokawa references disclose the analogous composition and a process for making said composition, thus the low gelation degree is reasonably expected in Shimokawa '041. (Office Action page 2, paragraph 4 - page 3, paragraph 3)

'041 discloses a continuous process for the production of AES (styrene- and acrylonitrile-grafted EPDM rubber) in which the monomer conversion in the 1st reactor, according to Claim 1, is 40 - 80 %. Further, '041 disclosed the importance that the ungrafted EPDM content in the end product is very low (see column 4, lines 17 - 20). The degree of grafting is described in the examples and is between 62 and 73 % and, according to column 4, lines 11 - 13, is sufficiently high.

AES of Applicants' Invention differs significantly from '041.

	US 4,314,041	APPLICANTS' INVENTION
Conversion in 1st reactor	Claim 1: 40-80 % Preferable: 50-75 % (column 5, line 67) Ex.: 52-73 %	Claim 6: > 30 % Ex.: 43-50
Degree of grafting	Ex.: 62-73 %	Claim 1: 25-65 % Preferably: 30-60 %, p. 3, line 32 Ex.: 34-52 %
Gel _(THF)	Not specified	Very low: 0.2-2.2 % (acc. to ex.)
Gel _(THF) /gel _(acetone) ratio	Not specified	Less than 0.1

Applicants' AES material, which has a lower conversion in the 1st reactor and has significantly lower degrees of grafting than '041, surprisingly has a high notched impact strength (ΔE [kJ/m²]: 27 - 36) and high gloss (91 - 96 at an angle of 60°). The low gel_(THF) value and the resultant low gel_(THF)/gel_(acetone) ratio of less than 0.1 indicate that the vastly predominating proportion of the EPDM rubber is in uncrosslinked form. However, compared to '041, since the degree of grafting is intended to be as high as possible and the proportion of ungrafted EPDM is very small, '041 suggests the presence of a crosslinked material.

US 4,268,638 ('638) discloses additional peroxide crosslinking of the EPDM rubber before the actual grafting with monomers. In fact, '638 teaches away from Applicants' invention, namely an EPDM rubber which is as uncrosslinked as possible. The Office Action alleges that '638 "discloses a low gelation degree of not more than 5%, column 3, lines 7" (Office Action, page 3, lines 7-8). In '638 that the rubber crosslinking (rubber gelation degree) is not more than 5 % - and is relatively low, however this relates to the starting material and not, as in Applicants' invention, the end product. The EPDM rubbers employed by Applicants have a linear or branched structure, but not a partially crosslinked structure.

The EPDM graft polymerization gives only weakly crosslinked EPDM graft polymer which provides only poor impact strength (column 1, lines 23-27).

Surprisingly, Applicants found the opposite with AES materials of the present invention, namely high notched impact strengths.

Thus, it would not have been obvious to one skilled in the art to consider that '041 in view of '638 also discloses a low gelation degree since both references disclose the analogous composition and a process for making the composition which is not that of Applicants' invention, including that the weight average molecular weight of the continuous phase is 130,000 to 275,000 g/mole and where the disperse phase is characterized in that its weight average particle size is less than 0.90 μ m, its degree of grafting (measured by gel value measurement in acetone as solvent) is 0.25 to 0.65, the ratio of the gel value measured in THF to the gel value measured in acetone is less than 0.1 and the glass transition temperature of the ethylene / α -olefin rubber (determined by measuring the complex shear modulus as a function of the temperature) is less than -50°C. Reconsideration is requested.

Claims 2-7 and 9-10 depend from Claim 1, which as discussed is believed to be allowable. Thus, Claims 2-7 and 9-10 are also believed to be allowable.

Reconsideration is requested.

2. Claim 10 stands rejected under 35 USC 103(a) as being unpatentable over '041 in view of '638 in further view of '778. The rejection should be withdrawn in view of the remarks below.

'778 discloses an impact-modified, weathering-resistant thermoplastic based on a hydrogenated styrene-butadiene rubber. This product can be mixed with a multiplicity of polymers, including polycarbonate, polyester and polyamide (column 9, lines 15 - 32). Whereas, Applicants disclose in the specification that PC/AES blends based on a commercial AES and based on comparative examples provide worse results in the form of low-temperature toughness than the PC/AES blends according to Applicants' invention. Applicants claim a very specific AES (glass temp. EPDM, SAN molecular weight, particle size, degree of grafting, gel content, gel value ratio) with improved quality compared with AES and PC/AES blends which are not according to Applicants' invention and are presented in the comparative examples.

A person skilled in the art, would not be able to combine the teachings of '041, '638 and '778 including a blend of polycarbonate and a thermoplastic based on

a hydrogenated styrene-butadiene rubber to obtain improved properties of Applicants' AES and PC/AES (see comparative examples) and arrive at Applicants' invention.

In view of the above amendments, Applicants submit that the claims are in condition for allowance and the Examiner would be justified in allowing them.

Respectfully submitted,

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